

## **CLAIM LISTING**

Claims 1 through 56. (Canceled).

57. (New) A method of rendering a substrate catalytic to electroless metal deposition comprising the steps of: (a) depositing a ligating chemical agent on said substrate, which is capable of both binding to said substrate and ligating to an electroless plating catalyst; and (b) ligating said electroless plating catalyst to said ligating chemical agent,

wherein said ligating chemical agent is a bifunctional molecular species of the form  $R_7R_8P(CH_2)_nPO_3R_9R_{10}$ , wherein  $n$  is between 1 and 20, and wherein  $R_7$  and  $R_8$  are substituted or unsubstituted alkyl groups, substituted or unsubstituted aryl groups, or substituted or unsubstituted heterocyclic groups, and may be the same or different, and wherein  $R_9$  and  $R_{10}$  are hydrogen atoms.

58. (New) The method of claim 57, further comprising, after step (a), the step of contacting said substrate with a chemical reagent capable of reacting with at least one functional group of said ligating chemical agent.

59. (New) The method of claim 57, wherein said substrate is selected from the group consisting of: silicon oxide, titanium oxide, zirconium oxide, indium tin oxide, indium zinc oxide, tin oxide, zinc oxide, copper oxide, aluminum oxide,

nickel oxide, and combinations thereof.

60. (New) The method of claim 57, wherein said substrate comprises a polymer with surface hydroxyl groups.

61. (New) The method of claim 57, wherein said electroless plating catalyst is a palladium catalyst.

62. (New) The method of claim 57, wherein said electroless plating catalyst is a palladium-tin colloid.

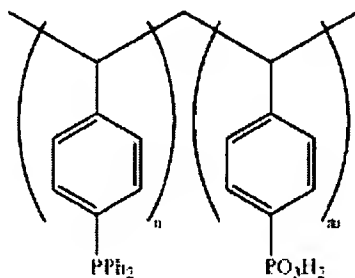
63. (New) The method of claim 57, wherein said electroless plating catalyst is selected to deposit metals from the group consisting of: cobalt, nickel, copper, gold, platinum, palladium, silver, and alloys thereof.

64. (New) An article of manufacture comprising a substrate rendered catalytic according to the method of claim 57, having a metal coating over portions of said substrate in a selected pattern and being bonded to said substrate through an intermediate layer of catalyzed ligating chemical agent.

65. (New) A method of rendering a substrate catalytic to electroless metal deposition comprising the steps of: (a) depositing a ligating chemical agent on said substrate, which is capable of both binding to said substrate and ligating to

an electroless plating catalyst; and (b) ligating said electroless plating catalyst to said ligating chemical agent,

wherein said ligating chemical agent has the chemical structure:



66. (New) The method of claim 65, further comprising, after step (a), the step of contacting said substrate with a chemical reagent capable of reacting with at least one functional group of said ligating chemical agent.

67. (New) The method of claim 65, wherein said substrate is selected from the group consisting of: silicon oxide, titanium oxide, zirconium oxide, indium tin oxide, indium zinc oxide, tin oxide, zinc oxide, copper oxide, aluminum oxide, nickel oxide, and combinations thereof.

68. (New) The method of claim 65, wherein said substrate comprises a polymer with surface hydroxyl groups.

69. (New) The method of claim 65, wherein said electroless plating catalyst is a palladium catalyst.

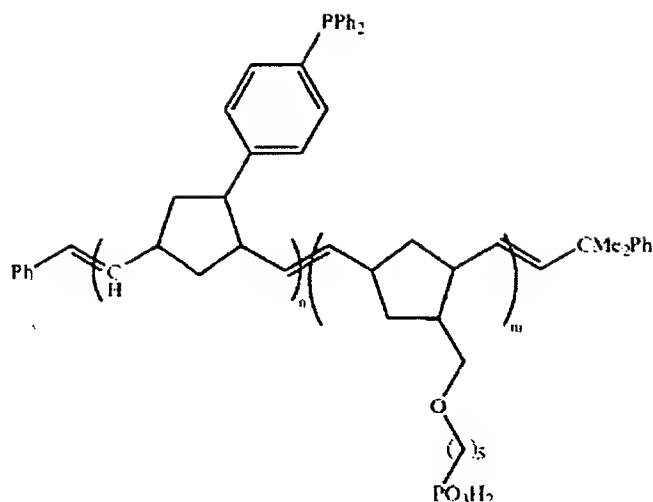
70. (New) The method of claim 65, wherein said electroless plating catalyst is a palladium-tin colloid.

71. (New) The method of claim 65, wherein said electroless plating catalyst is selected to deposit metals from the group consisting of: cobalt, nickel, copper, gold, platinum, palladium, silver, and alloys thereof.

72. (New) An article of manufacture comprising a substrate rendered catalytic according to the method of claim 65, having a metal coating over portions of said substrate in a selected pattern and being bonded to said substrate through an intermediate layer of catalyzed ligating chemical agent.

73. (New) A method of rendering a substrate catalytic to electroless metal deposition comprising the steps of: (a) depositing a ligating chemical agent on said substrate, which is capable of both binding to said substrate and ligating to an electroless plating catalyst; and (b) ligating said electroless plating catalyst to said ligating chemical agent,

wherein said ligating chemical agent has the chemical structure:



74. (New) The method of claim 73, further comprising, after step (a), the step of contacting said substrate with a chemical reagent capable of reacting with at least one functional group of said ligating chemical agent.

75. (New) The method of claim 73, wherein said substrate is selected from the group consisting of: silicon oxide, titanium oxide, zirconium oxide, indium tin oxide, indium zinc oxide, tin oxide, zinc oxide, copper oxide, aluminum oxide, nickel oxide, and combinations thereof.

76. (New) The method of claim 73, wherein said substrate comprises a polymer with surface hydroxyl groups.

77. (New) The method of claim 73, wherein said electroless plating catalyst is a palladium catalyst.

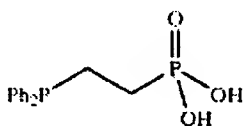
78. (New) The method of claim 73, wherein said electroless plating catalyst is a palladium-tin colloid.

79. (New) The method of claim 73, wherein said electroless plating catalyst is selected to deposit metals from the group consisting of: cobalt, nickel, copper, gold, platinum, palladium, silver, and alloys thereof.

80. (New) An article of manufacture comprising a substrate rendered catalytic according to the method of claim 73, having a metal coating over portions of said substrate in a selected pattern and being bonded to said substrate through an intermediate layer of catalyzed ligating chemical agent.

81. (New) A method of rendering a substrate catalytic to electroless metal deposition comprising the steps of: (a) depositing a ligating chemical agent on said substrate, which is capable of both binding to said substrate and ligating to an electroless plating catalyst; and (b) ligating said electroless plating catalyst to said ligating chemical agent,

wherein said ligating chemical agent has the chemical structure:



82. (New) The method of claim 81, further comprising, after step (a), the step of contacting said substrate with a chemical reagent capable of reacting with at least one functional group of said ligating chemical agent.

83. (New) The method of claim 81, wherein said substrate is selected from the group consisting of: silicon oxide, titanium oxide, zirconium oxide, indium tin oxide, indium zinc oxide, tin oxide, zinc oxide, copper oxide, aluminum oxide, nickel oxide, and combinations thereof.

84. (New) The method of claim 81, wherein said substrate comprises a polymer with surface hydroxyl groups.

85. (New) The method of claim 81, wherein said electroless plating catalyst is a palladium catalyst.

86. (New) The method of claim 81, wherein said electroless plating catalyst is a palladium-tin colloid.

87. (New) The method of claim 81, wherein said electroless plating catalyst is selected to deposit metals from the group consisting of: cobalt, nickel, copper, gold, platinum, palladium, silver, and alloys thereof.

88. (New) An article of manufacture comprising a substrate rendered catalytic according to the method of claim 81, having a metal coating over portions of said substrate in a selected pattern and being bonded to said substrate through an intermediate layer of catalyzed ligating chemical agent.

89. (New) An article of manufacture comprising a substrate having a metal coating over portions of said substrate in a selected pattern and being bonded to said substrate through an intermediate layer of catalyzed ligating chemical agent.

90. (New) The article of claim 89, wherein said catalyzed ligating chemical agent comprises a ligating chemical agent having at least one functional group bonded to said substrate.

91. (New) The article of claim 89, wherein said catalyzed ligating chemical agent comprises a ligating chemical agent with at least one functional group bonded to said substrate and at least one other functionality bonded to an electroless plating catalytic material.

92. (New) The article of claim 89, wherein said catalyzed ligating chemical agent comprises an electroless plating catalyst electrostatically bound to a ligating chemical agent.



93. (New) The article of claim 89, wherein said catalyzed ligating chemical agent comprises an electroless plating catalyst coordinatively bonded to a ligating chemical agent.

94. (New) The article of claim 89, wherein said substrate is selected from the group consisting of: silicon oxide, titanium oxide, zirconium oxide, indium tin oxide, indium zinc oxide, tin oxide, zinc oxide, copper oxide, aluminum oxide, nickel oxide, and combinations thereof.